

Where Sustainment Meets Deployed Forces

Do You Really Know Who's Going to
Maintain Your Aircraft and
Where It's Going to be Maintained?

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Report Documentation Page			Form Approved OMB No. 0704-0188		
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1. REPORT DATE DEC 2013	2. REPORT TYPE	3. DATES COVERED 00-00-2013 to 00-00-2013			
Where Sustainment Meets Deployed Forces: Do You Really Know Who's Going to Maintain Your Aircraft and Where It's Going to be Maintained?			5a. CONTRACT NUMBER		
			5b. GRANT NUMBER		
			5c. PROGRAM ELEMENT NUMBER		
6. AUTHOR(S)			5d. PROJECT NUMBER		
			5e. TASK NUMBER		
			5f. WORK UNIT NUMBER		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Defense Acquisition University, Defense AT&L, 9820 Belvoir Road, Fort Belvoir, VA, 22060-5565			8. PERFORMING ORGANIZATION REPORT NUMBER		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)			10. SPONSOR/MONITOR'S ACRONYM(S)		
			11. SPONSOR/MONITOR'S REPORT NUMBER(S)		
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 6	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			



U.S. Marine Corps photo by Lance Cpl. Sean D. Ross

Did you know that an 18-year-old is fixing a \$55 million aircraft on the flight deck of an aircraft carrier at night, with rolling seas and salt spray shooting across the flight deck? Did you know that a 20-year-old is on deployment in Afghanistan maintaining an aircraft that just landed in a sandstorm? And, finally, did you know that a South Korean aerospace company is performing scheduled depot maintenance on U.S. Marine Corps helicopters?

How can one possibly plan to maintain aircraft in such myriad environments, cultures and geographically dispersed locations? A key question to ask as acquisition professionals is: "Have we properly equipped those maintainers with everything that they need to effectively and affordably perform the maintenance that is required so those aircraft can quickly return to an operational status in order to support training and combat operations?" Let's discuss how it is possible to properly equip these maintainers for success and how Naval Aviation is approaching maintenance planning, scheduling and execution (MPS&E).

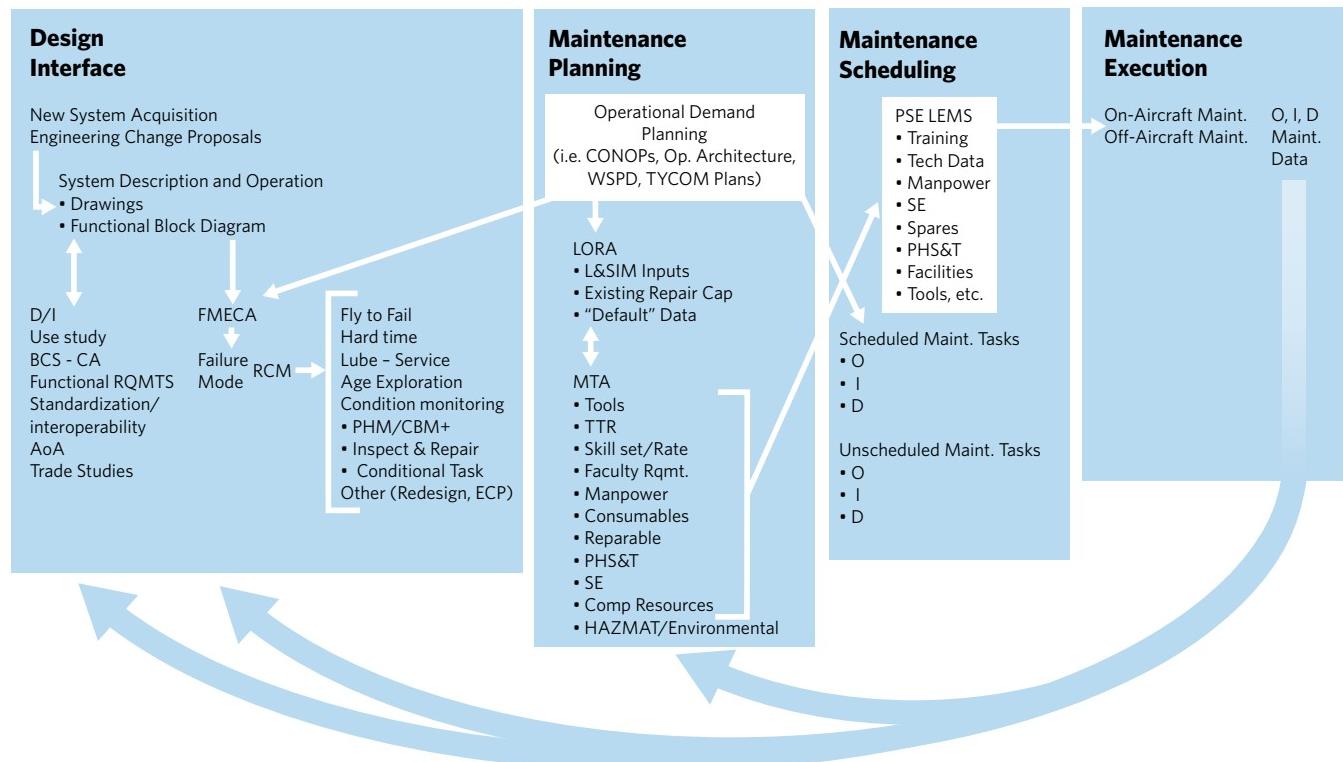
Supporting Combat Readiness Now and in the Future

When faced with the requirement to support the Naval Aviation Enterprise (NAE), one must not just think land-based. The possibilities of where the systems will operate and be maintained include land-based; ship-based (carrier, cruiser, destroyer or amphibious); multi-aircraft detachments; and foreign countries, including foreign military sales (FMS). Today's depot artisan, plus the industrial repair sites referred to as Fleet Readiness Centers (FRCs), must be flexible and their capabilities must be exportable on a moment's notice to support the warfighter's needs regardless of location.

Within the Naval Air Systems Command (NAVAIR) is the Industrial & Logistics Maintenance Planning & Sustainment Department, NAVAIR 6.7, with its major focus and responsibility on Maintenance Planning and Scheduling. NAVAIR 6.7, as shown in Figure 1, is implementing standardized processes to support the NAE goal of combat readiness now and in the future. The MPS&E process identifies four primary areas—Design Interface, Maintenance Planning, Scheduling

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Figure 1. Life-Cycle Maintenance Planning, Scheduling & Execution



and Execution. Operational Demand Planning is the crucial element that drives the entire MPS&E process. Operational Demand Planning information comes from the Concept of Operations (CONOPS), the Joint Capabilities and Integration Development System (JCIDS), Operational Architecture of the system, the Weapons Systems Planning Document (WSPD) and the Type Commander Plans. A deeper look into the four primary areas benefits the understanding required for identification of the process.

Design Interface—*influence the design*: The Design Interface goal for a new weapon system acquisition or Engineering Change Proposal is to eliminate, reduce or simplify the need for logistics. This is accomplished by influencing the design during the systems engineering process from its inception throughout the life cycle.

Plan for Maintenance commonly is referred to as Maintenance Planning. You may ask, "Why do we have to perform maintenance?" Simply put, maintenance is required on a weapon system primarily to mitigate a failure mode that could not be designed out of the weapon system. The reason it could not be designed out usually falls into two areas: We could not afford to design the failure mode out or the technology wasn't available/mature enough to design out the failure. Utilizing Failure Modes Effect and Criticality Analysis (FMECA) data, Reliability Centered Maintenance (RCM) analysis is conducted on the maintenance significant failure modes. The output of the RCM analysis includes recommendations—i.e., no preventative maintenance required or age exploration or some type of

preventative maintenance task required. An output also could be a recommendation for a Condition Based Maintenance Plus (CBM+) or Prognostic Health Maintenance (PHM) type solution to mitigate the failure mode. Maintenance Task Analysis and Level of Repair Analysis then are conducted on those maintenance tasks that subsequently provide the Product Support Manager (PSM) with the requirements for the Product Support Package. (Naval Aviation utilizes the three-level maintenance concept. Maintenance levels are determined by the Supportability Analysis conducted within the NAVAIR 6.7.1.)

Maintenance Scheduling is conducted for both "scheduled" and "unscheduled" maintenance actions at all three levels of maintenance. Scheduling of maintenance tasks is completed based upon operational requirements and production schedules.

Maintenance Execution: In the end product, all the 12 product support elements come together, and maintenance actually is performed at the O, I, & D levels. Measures (metrics) are being put in place throughout the life-cycle MPS&E process to ensure that what was "planned" for "actually" is happening. Those measures are the early indicators that something isn't working according to plan and a root-cause-analysis is needed.

So we now have looked at an overview of the four key areas that NAVAIR 6.7 has highlighted as "focus areas" for improving weapon system sustainment. While policy and planning are one end of the question, the actual tip-of-the-spear execution can be quite another. We now will shift our focus to the "tip of

the spear" and look through the eyes of Fleet Readiness Center Western Pacific (FRCWP) to see how these process improvements will help conduct the myriad necessary repair events to support forward deployed operations, as well as help face the challenges that still exist.

FRC Western Pacific Overview

First a quick overview of FRCWP, so you have an idea on the scope of the command and required support. FRCWP's vision is to be a world-class Forward Deployed Depot Maintenance Activity. The goal is to provide quality depot level aviation maintenance for all Navy and Marine Corps Forces outside the United States through:

- Scheduled Maintenance with International Commercial Partners for 12 Types, Models, Series Aircraft
- Unscheduled Maintenance through In-Service Repair (ISR) for all Types, Models, Series
- Support Equipment Overhaul

FRCWP's primary customers for scheduled depot aircraft maintenance are 1st Marine Air Wing (1st MAW), Carrier Air

from FRCWP is essential to support forward deployed readiness requirements. FRCWP is a one-stop-shop operation where planned maintenance events, modifications and any required ISR tasks must be accomplished in conjunction with each other. This means all maintenance tasks, engineering support and required parts support must be aligned to meet completion dates for the aircraft.

"Working to together"—Results of NAVAIR 6.7 Emphasis on Deployed Operations

Next we will look at some lessons learned within FRCWP operations that are being used to improve upon the maintenance planning policies, processes, tools and training within NAVAIR 6.7.

Design Interface and Maintenance Planning

- **Design Interface/Maintenance Planning Products:** Maintenance specifications (specs) for scheduled depot maintenance events typically have been developed for organic, CONUS FRCs. This has caused major problems for the foreign commercial companies as the specs were not written as detailed work packages. (CONUS FRCs develop

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Wing FIVE (CVW-5), HSM-51, HSC-25 as well as all CONUS Patrol and Reconnaissance P-3 Wings. Additionally, FRCWP performs ISRs on deployed USN and USMC aircraft as well as other Services and coalition partners around the world. It also performs Ground Support Equipment overhaul for all USN/ USMC forces outside the Continental United States. FRCWP is headquartered at Naval Air Facility Atsugi, Japan, and has detachment sites in Iwakuni and Okinawa, Japan; Sacheon and Gimhae, South Korea; Camp Bastion/Leatherneck, Afghanistan; Singapore and Guam.

Scheduled Aircraft Depot Maintenance Overseas

FRCWP performs scheduled aircraft depot maintenance using international contractors. Currently, these contractors are NIPPI Corp., Korean Air (KAL), Korean Aerospace Industries (KAI) and Defense Support Services (DS2). The other Services also use some of these same companies for aircraft overhaul. One difference between FRCWP and CONUS activities is that operational squadrons normally receive the same aircraft back from FRCWP that they induct, and there is very little aircraft Work In-Process (WIP). There isn't an "aircraft buffer," so the on-time delivery of aircraft

associated work decks with detailed procedures to execute the RCM justified maintenance specs.) NAVAIR 6.7.1 is updating policies, processes and training to require valid Maintenance Task Analyses for all levels of maintenance, including depot, to help resolve spec issues.

- **Technical Data Efficiencies:** Another challenge at FRCWP is that foreign international companies are working on aircraft developed and built by U.S. companies. This creates a foreign disclosure issue that must be managed carefully. In addition, the data can be proprietary and disclosing the data to potential competing companies is a major issue that must be worked through in each NAVAIR Program Office. FRCWP works closely with the NAVAIR Program Offices—individually called a "PMA" for Program Management, Air—to ensure data and proper disclosures in order to award contracts and perform maintenance with foreign providers.

Maintenance Planning & Execution

- **Increased and Effective Communication and Planning with PMAs:** FRCWP faces the challenges of incorrect/outdated program CONOPS and Weapon System Planning Documents (WSPD). Most original CONOPS, plans and

refinements are CONUS-focused, leaving FRCWP to figure things out when Type/Model/Series come into the area of responsibility. FRCWP is working diligently with the PMAs to help them understand the unique construct at FRCWP. The command has been working with AIR 6.7 to reach all the maintenance planners from a central source so they can properly plan for maintenance events in the FRCWP arena. (Accurate CONOPS, WSPDs, and Type Commander Plans will lead to refinement of Integrated Maintenance Concept prototype/Integrated Master Plans at all locations, including OCONUS, and will improve the strategic scheduling requirement discussions with the Fleet customers.)

- **In-Service Repairs (ISRs) and Effective Collection and Use of Maintenance Data:** FRCWP and NAVAIR know how critical it is to capture maintenance data in order to refine the maintenance requirements and specifications, specifically since effective RCM depends on accurate maintenance/failure data and artisan/maintainer input. Unfortunately, the repair data from these unscheduled depot maintenance actions-ISRs in particular—have not been captured over time. This is valuable data that RCM engineers and analysts could have used to update maintenance requirements. FRCWP and AIR 6.7 are working to implement a maintenance data capture system for all TMS that will capture the RCM quality data from these ISRs and scheduled maintenance events.

NAVAIR Commander's Focus area of "Increase Speed to the Fleet."

Maintenance Scheduling

- **Integrated Maintenance Concept (IMC) Event Builder and Execution Tool:** FRCWP is working to implement an "IMC Event Builder and Execution Tool," now in the functional requirements definition stage. It will enable the translation of specs into detailed work packages and provide a Web-based data collection and sharing tool set. The AIR 6.7.1 IMC and RCM national leads are working closely with FRCWP to ensure that their valuable maintenance data and knowledge are shared readily with the rest of the NAE.

Future DoD Focus on the Pacific and the "New" Challenges

DoD has stated a shift in focus to more emphasis within the Pacific Theater. Planned redeployment of U.S. Navy and U.S. Marine Corps forces in the Pacific has already begun and will require FRCWP to adjust as its customer base grows. This is an exciting time for leading change in the Pacific.

Unscheduled depot maintenance requirements have grown every year and the growth has been felt within FRCWP, which has seen a steady growth in the number of requests for ISRs (an increase of 65 percent over the last 5 years). FRCWP

FRCWP expects ISR demand to remain constant or grow based on planned operational support, even with the planned drawdown of forces in Afghanistan.

Our engineers and logisticians will use the data to improve existing maintenance plans. An increased focus on data collection at the task level as part of the maintenance execution phase will improve RCM analysis, resulting in highly effective maintenance plans.

- **FRCWP Quick Response Teams:** FRCWP has created 10 three-man teams with two mechanics and a Planner and Estimator aboard every deployed aircraft carrier (CVN) and at Camp Bastion, Afghanistan. The Afghanistan Detachment also has artisans on a rotational basis from other FRCs and Navy Reserve military personnel from the Forward Deployed Combat Repair Team managed out of Patuxent River, Md. FRCWP also has machinists and F/A-18 Fuel Cell Mechanics for as-needed requirements. When not on regularly scheduled deployments, the teams are on-call to respond anywhere in the world other than CONUS or Hawaii. These teams operate in direct support of the

expects ISR demand to remain constant or grow based on planned operational support, even with the planned drawdown of forces in Afghanistan. This will entail some additional strategic planning from FRCWP to ensure that sufficiently qualified artisan personnel and an adequate supporting structure are available to meet the expected growth. This also will entail leveraging expertise and sharing challenges and lessons learned with NAVAIR in order to improve the Maintenance Planning process.

Conclusion

Remember the myriad environments, skillsets and cultures we discussed in the beginning? Whether it is an 18-year-old maintaining an aircraft on the flight deck or in the desert, or a foreign international depot artisan performing scheduled maintenance in South Korea, the PSM must ensure that we properly plan for maintenance at all levels (O,I & D), all locations, and at the right time (interval) while optimizing resources.

We have shown how enhanced focus on specific areas of the Life Cycle Maintenance Planning, Scheduling & Execution System at the NAVAIR NAE level will serve as an enabler to the forward deployed aircraft repair sites. Additionally, we have shown how FRCs lessons learned are being used to provide enhancements to NAVAIR 6.7's maintenance planning processes and tools—which will lead to positive impacts for the forward deployed customers on the tip of the spear.

We discussed the initiatives and desired outcomes with Rear Adm. CJ Jaynes, former Commander Fleet Readiness Centers and NAVAIR Assistant Commander for Logistics and Industrial Operations. She provided the following insight: "As one can imagine, it's extremely challenging to plan for all of the operational scenarios associated with supporting the Naval Aviation Enterprise. That is why it is so essential that we utilize our core processes (such as Design Interface and Maintenance Planning) and let these robust analyses build and sustain our product support packages to affordably meet readiness requirements throughout the life cycle of a weapon system."

We are all very aware of the focus on Operations and Support Costs as a percentage of the annual National Defense Authorization Act DoD budget. So we asked Rear Adm. Timothy Matthews, OPNAV N43—director of Fleet Readiness—how initiatives like those of NAVAIR 6.7.1 have impacted current and out-year budgeting within the Planning, Programming, Budgeting and Execution process. Matthews said, "We are faced with great fiduciary challenges but we must remain fo-

cused on the readiness of our platforms and people to avoid a 'hollow force.' We must continue to safely operate and maintain our aging Fleet of aircraft while introducing new weapon systems, all while facing significant budget shortfalls.

"It is imperative that we have optimized maintenance processes with repair turnaround times that allow the NAE to consistently meet our readiness requirements. And what I mean by 'optimized' is that we don't 'over-maintain' or 'under-maintain' our aircraft. We need to maintain the aircraft when and where it is needed to safely, effectively and affordably support our combat forces. The efforts of FRCWP, COMFRC [Commander, Fleet Readiness Centers] and NAVAIR 6.7 are great examples of what must be done to ensure that Naval Aviation remains a viable deterrent to those who want to do us harm," Matthews said.

In today's austere budget environment, we must all take another look at what might have been "status quo" on how to approach the way we do business. This is but one example of how the Logistics and Industrial Competency within NAVAIR is approaching the areas of maintenance planning and how the implemented changes will enable the forward deployed FRC to turn the "new" policy into actionable processes to support the warfighter's operational needs where it matters most. &

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